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MOHAMMEDAN MEDICAL PRACTICE IN COTABATO PROVINCE [1]

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(*Cotabato, Cotabato, P. I.*)

ONE PLATE AND SEVEN TEXT FIGURES

Cotabato Province is the largest province in area in the Philippine Islands, measuring 28,593 square kilometers. The number of inhabitants is not accurately estimated; the official census of 1903 places the population at 125,875. The following is an estimate appearing in the annual report for 1915, of the Provincial Governor of Cotabato, regarding the non-Christian population of the province:[2]

TABLE I.—*Non-Christian population of Cotabato Province.*

Mohammedan:	
Maguindanao, Maranao, Iranun, Sangil, Samal, Sulug (Joloanos)	151,000
Pagan:	
Manobos and Bagobos	15,000
Bilanes	8,000
Tirurayes	5,000
Tagabilis	1,000

[1] This is the first of a series of reports on the local medical practices in the Department of Mindanao and Sulu, suggested by the Chief Health Officer, Dr. Jacobo Fajardo.

[2] See also Beyer, H. Otley, Population of the Philippine Islands in 1916. Philippine Education Co., Inc., Manila (1917), for the most recent estimates.

The Maguindanao people are the most numerous and most powerful people in Cotabato Province; they occupy the whole valley of Cotabato and are scattered along the coast, but usually never live up the hills. The Maranao live in the range of mountains between Lanao and Cotabato. The Sangils live in Sarangani Island. The Iranun live along Mulitabug River and also along the coast. There are a few Samals living in Bongos Island and along the sea coast wherever their vintas happen to stop. A few hundred Joloanos have settled on one end of Bongos Island.

There are two kinds of Manobos: Manobos living on the Apo range (Kidapawan region), who are mixed with Bagobos, and there are Manobos living on the mountains along the sea coast south of Lebak. The Bilans live on the mountains of Matutum region and on the southern range of mountains between Davao and Cotabato. The Tirurayes live on the hills of the municipal district of Auang and on the hills along the sea coast between Cotabato and Lebak. There are a few Tagabilis living on the hills along the sea coast between Kran and Sarangani Bay.

The main occupation of the different tribes is agriculture and to some extent hunting and fishing. The Samals, however, live exclusively by fishing.

The commonest diseases are: Malaria, tuberculosis, and diseases of the skin, as an example tinea circinata (dhobie itch). In this report I shall treat mainly of the medical practice among the Maguindanaos, which is typical of the practice of the Mohammedan (Moro) population in Mindanao.

The following diseases and conditions are recognized by the Maguindanaos:

TABLE II.—*Diseases and conditions recognized by the Maguindanaos.*

Abas	Measles
Anga	Chicken pox
Bacatau	Yaws
Bakil	Yaws of palmar and plantar surfaces
Barirang	*Ascaris lumbricoides* infection
Batuc	Cough
Beneg	Goitre
Bilas	Conjunctivitis
Bingki	Mumps
Buguis-casila	Dhobie itch or tinea circinata
Buguis-murus	Tinea imbricata
Bulay	Otitis
Bungcaut	Keratoderma plantaris et palmaris
Bunug	Insanity
Buransi	Stomatitis or glossitis with white patches or membrane

TABLE II.—*Diseases and conditions recognized by the Maguindanaos*—Cont'd.

Busucúl	Indigestion
Cabisú	Deafness
Cabutá	Blindness
Caludusan	Abortion
Calugú	Wart
Catal or ibul	Furunculosis
Catú	Abscess, chronic
Curbau	Œdema of legs and abdomen. Beriberi
Darati	Tubercular adenitis and ulceration of neck
Dudsul	Sty
Garak	Neuralgia
Ila	Pigmented mole
Ing	Carbuncle
Ipul	Leprosy, tubercular
Kaluli	Scabies
Kudep	Colo-colo (retraction of penis)
Lacap or siruñgan	Day blindness
Lamlam	Eczema or itch of the scrotum and penis
Lañgilau	Headache
Lebag	Tumor or inflammation
Lumasá	Coryza
Magudu	Diarrhœa
Magudu sa rugu	Dysentery
Manu-manucan	Night blindness
Mapansi	Cachexia, anæmia
Mauaga	Abscess
Mayau	Fever
Mayau-matingau	Malaria
Muta-mudu	Cholera
Palí	Wound in general
Pamagat	Yaws, articular symptoms
Pamari	Keratoma plantaris sulcatum. Same as bakil, with fissuration
Pambabuyen	Epilepsy
Pamunus	Acne vulgaris
Pamuti	Leprosy
Panau	Tinea versicolor
Panú	Smallpox
Pañgater	Muscular rheumatism of legs in old people
Pasmá	Fever, believed to be internal
Pedsá	Large furuncle, usually single
Pigket or nasadir	Paralysis
Putic	Leucoderma
Rastun	Ulceration of palate and nose (espundia)
Ratiun	A kind of poisoning believed to kill instantly

TABLE II.—*Diseases and conditions recognized by the Maguindanaos*—Cont'd.

Rayur	Pthisis
Saguiap	Erysipelas. Herpes zoster
Sakit	Pain or disease located anywhere
Sakit a mama	Disease of man, gonorrhœa
Salabi	Chilblains
Salamat-iblis	Pain or disease due to the devil
Salilau	Stomatitis, coated tongue
Sedsed	Circinate eruption of yaws or any serpiginous eruption or sore
Taguitic	Difficulty in urination
Takendi	Dysentery. This term is applied when there is an abundance of mucus mixed with blood
Tebpig	Lepra. Any chronic ugly ulcer
Tumiti sa nana	Gonorrhœa
Uasir	*Oxyuris vermicularis* infection
Ugam	Pharyngitis and laryngitis
Ulag	Deep pain in plantar surface of foot, supposed to be transmitted to leg. Rheumatism of foot
Ulapig	Cold feeling, but not actual ague, specially in old people, associated usually with pañgater
Uled	Worms, intestinal
Umau	Dumbness
Umes	Asthma
Urac a ating	Prickly heat

CAUSATION OF DISEASE

The Maguindanaos attribute diseases to a variety of causes, such as poison, hunger, wind, sun, unfulfilled customs, promises or oaths, and animalcules, but the most frequent causes, however, are malignant spirits.

During the recent cholera epidemic in Cotabato Province (1915) people quarantined themselves against all strangers, and several persons were detained, searched, and threatened bodily harm because they were suspected of carrying poison which caused the cholera. In the disease called pasmá (fever) the symptoms differ according to the causative factor: from "hunger," cold all over the body first and fever afterward; from the "wind," fever inside and cold outside of the body; from the "sun," fever outside and cold inside; from "getting wet," the same symptoms as from wind. Pasmá is more liable to follow if a person gets wet or takes a bath while the sun is at its zenith. They have no conception of microbes, but they believe some minute worms, *kanam*, to be the cause of scaly skin diseases and

also recognize small parasites, *cagau*, which they frequently see in the common itch (scabies).

The practice called *tauacal* is often done in order to find the cause of the disease in regard to customs, promises, and oaths, deducing at the same time the method of treatment. An egg is divided in five equal areas radiating from the smaller end, and on the areas thus outlined the following words are marked: *asal, sapa, panaman, samayá,* and *umur,* as shown below:

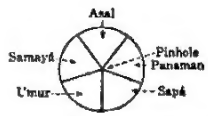

FIG. 1. The smaller end of the egg.

The egg is arranged in a coconut shell so as to stand up straight, a pinhole is made at the center of its smaller end, and after praying God to indicate the true nature of the disease, a piece of burning charcoal is applied at the bottom of the egg. The heat dilates the air space of the egg and expels some of its contents, and according to the area in which they are spilt, the cause of the disease is indicated. In the area of asal the patient is sick because he forgot to follow some of the customs of his ancestors, such as praying, giving alms, etc.; in sapá the patient did not fulfill an oath taken on the Koran; in panaman he failed to fulfill an unspoken promise; in samayá he failed to fulfill a spoken promise; in umur the cause of the disease may be anything, but the patient will irremissibly die.

Some panditas believe that there is a different cause for the diseases according to the day of the week such a disease began. A disease beginning on Sunday is caused by the devil; a disease beginning on Monday is caused by the wind; on Tuesday, by water; on Wednesday, by the sun; on Thursday, by hunger; on Friday, by an agent acting while one is asleep; and on Saturday, by an internal wound.

Satan and the rest of the devils and ghosts are credited with other diseases, the so-called *tinembas sa busau,* which are intense internal pains, such as colic, supposed to be internal wounds produced by the devil by striking a person with a leaf of cogon or with the midrib of a buri or coconut leaf, but which makes no marks on the outside.

Development of disease in one person through the spiritual agency or incantations of another, *papapantac* (analogous to the *mancuculam* of Luzon), is commonly believed. The people

of Lianĝan, a place on Illana Bay, in Lanao Province, are greatly feared because they are reputed to know this art. The papapantac prays for seven days, because the birthday of any person must have been one of the seven days of the week, and during these days he abstains from washing his anus and external genitalia after performing an act of nature. The papapantac makes a human form out of clay or tallow, or draws a human figure on paper, or uses an egg or a lemon, on which are marked both the earthly and heavenly names of the person whom it is desired to make sick and his place of residence. The human figure is placed in cold water, on the fire, exposed to the sun and rain, or pricked with needle or knife, according to the kind of disease on the part of the body where suffering is desired. A tail of buri is attached to the egg or lemon, and after the seven days of prayer, the egg or lemon is inclosed in a box and allowed to fly to the person to whom injury is desired.

To counteract the influence of the papapantac or to avoid other kinds of evil, the Moros place under the mattress of their beds a goat skin with various colors and offer a prayer, *tindig*, before going and before leaving the bed.

PROGNOSIS OF THE DISEASE

When a person is sick, the probable outcome is found by opening the Koran and determining the hour, day, month, and tide in which the disease began.

The opening of the Koran is done by the highest ranking pandita (priest) or hadji (person who has been in Mecca) around. Prayer is made, asking God that light be given on the disease in question, the Koran is opened with the eyes closed, and the first consonant letter of the seventh line of the page to the right is noted. This letter is called *aual*. Then seven sheets of the Koran are counted to the left, beginning with the sheet next to the page where the aual was noted, and the first consonant letter of the seventh line of the page to the right (left face of the seventh sheet) is also noted. This letter is called *agir*.

Every consonant letter in the alphabet has a meaning with regard to sickness and other conditions or enterprises. The following is the list of the letters with their significance in regard to sickness, according to Saika Datu-sa-Calañganan.[2]

[2] The Arabic characters and their names and equivalents are as furnished by the author of this paper.—THE EDITORS.

The following are good; sickness will be followed by rapid cure:

Letter.	Name.	Latin equivalent.
ا	Alip	Aspiration
ث ت ش	Tsa	Ts
ج	Jaa	J strong
د	Dal	D
ر	Ra	R
س ص	Sin	S
ط	Ta	T
ف	Kap	C or Q
م	Min	M
ن	Nun	N
ه ح	Ha	H
ء	Ambia	Expresses no letter
ي	Ya	Y

The following are bad; the disease will last long, but will not be followed by death:

Letter.	Name.	Latin equivalent.
ب	Ba	B
ح خ	Ja	J
د ذ	Dsal	Ch
ز ظ	Zay	Z
ش	Xim	X
س ص	Sada	S

Letter.	Name.	Latin equivalent.
ض	Lad	L
ظ	La	L
ع	Ain	H (silent)
غ	Gain	G
ك	Kap	K
ل	Lam	L
لا	Lamalip	La
و	Uau	U consonant

The following are very bad; sickness will be soon followed by death:

Letter.	Name.	Latin equivalent.
ت	Ta	T
ج	Geim	Guiu
ف	Pa	P

Some other panditas and hadjis do not agree entirely with the significance of certain letters as above noted. Datu Mastura, of Nuling, gives the following significance of the letters:

Good.		Equally good and bad.		Bad.	
ا	Alip	ج	Geim	ح	Ja
ب	Ba	ز	Dsal	ر	Zai
ت	Ta	ط	Ta	س	Sin
ث	Tsa	ظ	La	ش	Xim
ه	Jaa	ع	Gain	ق	Ain
د	Dal	م	Mim	ك	Kap (strong)
ر	Ra	ي	Ya	ل	Lam
ص	Sada	و	Uau	لا	Lamalip
ف	Lad	ف	Pa	ء	Ambia
ك	Kap				
ن	Nun				
ها	Ha				

In weighing the probable outcome of the disease by the aual and the agir found in the Koran, the agir is much more important. If both letters or if the agir alone is of bad significance the prognosis of the disease is bad. If both letters or if the agir is good the prognosis is good. If the aual and the agir found are the same letter, a *tangung* results; the prognosis is bad, especially when they are both the letter alip; then the patient will irremissibly die.

The prognosis of the disease is influenced by the *cutica*, or the hour period (*wactú*), in which it begins. The good cutica in regard to disease are *maisuara*, *sry*, and *bisnu*, and the nonfavorable cutica are *kala* and *barahama*. During the first day of any month the maisuara occupies the hour period *subu*, which is about from 6 in the forenoon to 2 in the afternoon; the kala reigns during the period of *lujur*, which is about from 2 to 4 in the afternoon; the sry reigns during the *asal* period, which is about from 4 to 6 in the afternoon; the barahama reigns during the *magarib* period, which is about from 6 to 8 in the afternoon; and the bisnu reigns on the hour period *aisa*, which is about from 8 in the evening to 6 in the morning. During the following days the cutica rotate in order, until the end of the month, when at the beginning of the new month the maisuara again reigns at the subu period.

TABLE III.—*Rotation of cutica.*

Hour period.	First day.	Second day.	Third day.	Fourth day.	Fifth day.	Sixth day.
Subu	Maisuara	Bisnu	Barahama	Sry	Kala	Maisuara.
Lujur	Kala	Maisuara	Bisnu	Barahama	Sry	Kala.
Asal	Sry	Kala	Maisuara	Bisnu	Barahama	Sry.
Magarib	Barahama	Sry	Kala	Maisuara	Bisnu	Barahama.
Aisa	Bisnu	Barahama	Sry	Kala	Maisuara	Bisnu.

A disease that begins on Sunday, Tuesday, and Saturday has a bad prognosis. A disease that begins on Thursday, Friday, and Monday is of good prognosis. A disease that begins on Wednesday is of neither bad nor good prognosis.

The months have their corresponding prognosis:

TABLE IV.—*Prognosis of months.*

Month.		
First	Mujarram	Bad
Second	Sapar	Do.
Third	Rabi-el-aual	Good
Fourth	Rabi-el-agir	Do.
Fifth	Guiumadil-aual	Do.
Sixth	Guiumadil-agir	Bad
Seventh	Raguiab	Do.
Eighth	Zaban	Good
Ninth	Ramadlán	Do.
Tenth	Xaual	Bad
Eleventh	Chiulcaida	Good
Twelfth	Chiuljiguia	Do.

A disease that begins with high tide is liable to be serious, whereas one that begins with low tide is more likely to be light.

TREATMENT OF DISEASES

The treatment of diseases is a mixture of religion, superstition, and medicine concocted by a *tabib* (medicine man) from herbs and plants.

When a person is sick, the windows are not usually closed, but the patient is always kept inside of the mosquito bar, which is made of heavy cloth (coco crudo) for fear the wind may hurt the patient. In some instances a smudge is kept at the foot of the stairs, as the disease is supposed to come up by the stairs, but not through the windows.

The medicine should be of the color of the cutica in which the disease began: maisuara, white; kala, black; sry, several colors; barahama, red; and bisnu, yellow. If the resulting medicine concocted is not of the color of the cutica, the patient

should give the tabib some object, such as money, clothing, turban, etc., of the color of the cutica. Some panditas and tabibs advise also to have the cloth covering the patient, as well as the one covering the medicine and the food, the color corresponding to the cutica in which his disease began.

If on opening the Koran the resulting prognosis of the disease is bad, the patient is moved to another house or place and the Koran is opened anew. The opening of the Koran and the transfer of the patient to another place or house in case of a bad omen is repeated three times or as many times as advised by the pandita.

The following practices are performed according to the advice of the panditas or according to what custom or promise was broken by the patient: (1) *Pedcanduli,* several panditas are invited, who pray to *Alathala* (God) for the healing of the patient, and the family in turn offer food and *sarcá* (alms) to the panditas. (2) *Pagubad,* a form of alligator is made of rice, with eyes made of eggs; it is eaten by the panditas and by the people. This is nearly a constant practice after childbirth. (3) *Paguipat,* in which *culintañgan* (music by *culintangs* and *agongs*) is made and food offered by hanging parcels of food wrapped in banana leaves on a branch of a tree or a pole planted near the house. Sometimes a small vinta is made, which is decorated with flags and with canons made of cooked rice and is provided with food and set adrift on the river. (4) *Pedsakay,* which is the same as paguipat, except that a warrior armed with kris and shield dances three times around the pole or branch of tree where the food is hung; then he cuts the tree or pole, and the food is picked up and eaten. (5) *Paigu sa ragat,* which means bathing in the sea of the people around the patient. If the people are far inland where they cannot get any sea water, they use fresh water to which a little salt has been added. The water is placed on a vinta, over which is made a platform where food is placed. The water is sprinkled and squirted on everybody by hand or by a wooden syringe, after which a bath is taken. The patient, however, need not be bathed with salt water, but may be sponged with coconut water to which some leaves of *kilala* and *salimbañgan* have been added. (6) *Pandudang,* which is done in cases where sickness is supposed to be due to not fulfilling a promise. A chicken, when cleaned of feathers and viscera, but retaining the head and feet, is boiled in water and placed in a tray, around which gather the patient and his friends, who stick the chicken with knives or bamboo points, repeating words to the effect that the promise is being

fulfilled. (7) *Gatasan,* done in cases where disease is supposed to be due to not fulfilling an oath taken on the Koran. A rope or bejuco is held by the pandita and the patient; on the pandita's end some chickens, clothing, or presents are tied. After a few prayers the pandita severs the rope between them and takes home whatever objects are tied to his end. (8) On the advice of the pandita the patient may promise that should he get well he would make a pilgrimage, *panundiung,* to visit and pray over the grave of a famous person. In all these ceremonies *tutugan* may be added, which is producing smoke by placing leaves of plants or incense over burning charcoal. Dancing by men and women, *bulalacau,* also may take place.

The tabib may be a layman, a pandita, or a hadji who knows how to cure diseases, and the profession is not circumscribed to any definite social class or caste. They are more or less charlatans and enjoy more or less reputation. One of them, Tabib Midsapak, of Maganuy, was famous on account of his success in curing diseases due to the devil.

The tabib or pandita called to attend the sick must leave his house, when called, at the hour period in which the cutica for his social status reigns (maisuara for datus, sry for women, bisnu for panditas, barahama for old patriarchs, and kala for warriors). The tabib, on entering the patient's house, washes his hands and feet up to the elbows and knees, looks at the patient, and concocts the medicine, over which usually he prays a *duana minangung* and afterward blows on it. The following duana minangung is the most frequently used around Cotabato:

"Bismil-laji rakmani-r-rajiim. Aljamduli-laji rabil-alamin, ar-rakmani rajiim; malikiyau-midin, iya kana-ambudu, wa iya kana-astain, ij-dinas siru-atal mustakim, siru-atal ladina an-amta ala-ijim, gai-iril maglubi ala-ijim, wa alau-waj lin amin."

MEDICINES USED

The pharmacopœia of the tabib is very extensive and contains plants, herbs, prayers, and cabalistic signs. The Maguindanaos possess books and writings containing prescriptions for diseases, called *paubatan.* Several of these, obtained from Datu Mastura, of Nuling; Datu Mañguda, of Lumbayanagui; Datu Guiukulanu, of Makadalung; and Saika Datu, of Taviran, were examined, and the following recipes are translated from them as illustrations:

Amenorrhœa.—The shavings of the bark of the following trees are mixed: *Buñgalauan, maguiakani, garu, saandana,* and *dalima,* linseed oil is added, and the concoction is drunk.

Anorexia.—An amulet is made with the words illustrated in fig. 2 written on it. This is used for children who do not suck or adults who have no appetite.

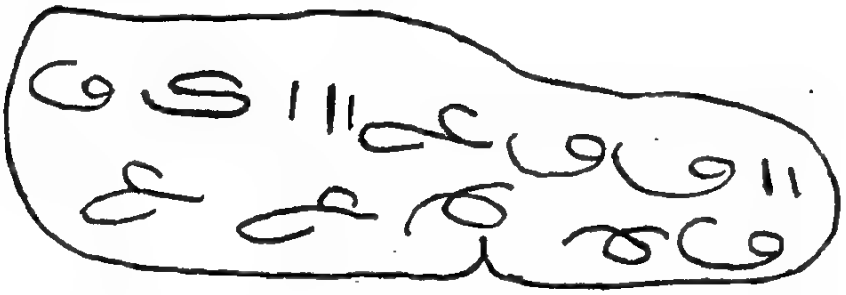

FIG. 2. Amulet for anorexia.

Asthma.—Write on a white cup the prayer called *patija* or duana minangung. In such a cup pomelo juice is placed in which a piece of hard Moro salt has been mixed for a short time. This mixture is then drunk.

Cold.—The following is a good medicine for a cold which produces rattling in the throat. Take equal parts of the earthen nest of wasps, shell of a hen's egg that did not hatch, and Chinese face powder, mix together and pulverize in a mortar, add pomelo juice, and apply to the throat.

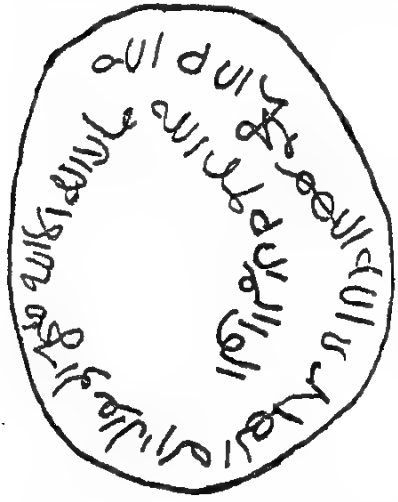

FIG. 3. Amulet for cough.

Cough.—The following signs (fig. 3) should be written in a white plate or cup and water placed on it. The water is drunk.

Crying.—The following signs (fig. 4) should be written and made into an amulet for a child who cries long and often.

Disease of children (*infantile beriberi?*).—Mix onion, incense, pepper, bearded palay, and any dirt in any crossbeam near the stairway of the house, add three eyelashes and a leaf of nipa from the roof, burn the whole mixture, and smoke the child while repeating the following prayer:

"Kaji ali andu jambri andu aski."

Disease of pain due to iblis (devil).—Chew together some *lubigan, kisul,* add onions, and spit on the painful part, then roll a chicken egg over it, while the following prayer is pronounced:

"Alajula ilaja ilajualayu lkayu lkayu mututa janunu sinatun ualanu munlaju mapi sampeki uamapil arlle manzaladchi yasepau enlaju elaby isniji alamu mabaena aydijim uamajalpajum ualayujituna bisayninminilmiji ilabimasa auasi-a kursiuju samawate ual arola ualaya uduju iplujuma uajual aliul alim."

Disease of men (gonorrhœa).—Cook together in water fruit of *tungki,* some pepper, saffron, cinnamon, *sibucao,* and *sanki.* This water should be taken at intervals, but should not be taken too much at a time, as it would produce diarrhœa.

Dysentery.—Cook together in water shoots of buri, sibucao, and guava. The water is then drunk.

Harmful prayers.—The signs shown in fig. 5, drawn on the door of the house, are a protection against any harmful prayer.

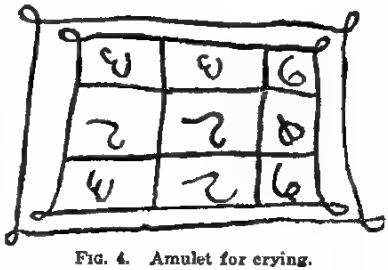

FIG. 4. Amulet for crying.

Headache.—Obtain sanki, leaf of *alem,* fruit of *tunki* and kisul, and shoot of a banana called *saguiñga busau.* Make shavings of all of these, add a little water, press them out together, and apply on the head.

Internal inflammations.—Obtain equal parts of the bark of the plant *katayatay,* shavings from *sibucao,* and leaves of *sambung.* Crush these together in a mortar and take.

Malaria.—Obtain thirty leaves of *salaysina* (yerba buena), on each of them write the letter alip, and then rub the body with them. Cook bamboo shoots in water, add a little honey, and then drink the mixture.

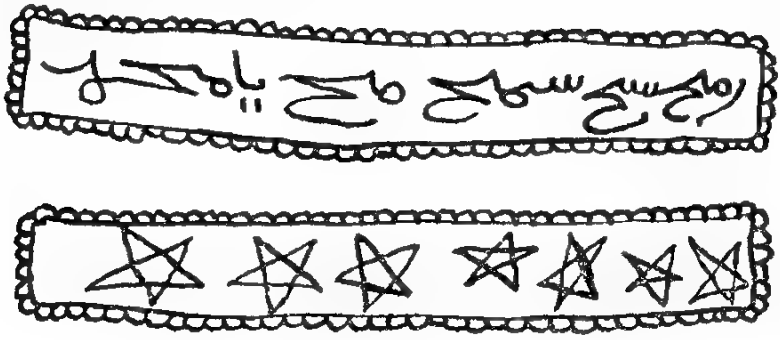

FIG. 5. Amulet for harmful prayers.

Pain in the abdomen or side.—Boil in water some garlic, red onions, and seven seeds of pepper. This is to be drunk tepid after saying the following prayer:

"Latud ridikujul absar ua jua yud rik jul absar ua jua latipul jabir."

Pain in the heart.—Wrap in a banana leaf about a handful of leaves of *tagum* and pepper, some ginger and saffron, and a little pomelo juice, place over burning charcoal, and apply on the painful part.

Pantak (*mancuculam*).—Certain signs drawn on a piece of white paper and sewn on the right upper side of the *malung* (sarong) have medicinal qualities and are a preservative against pantak.

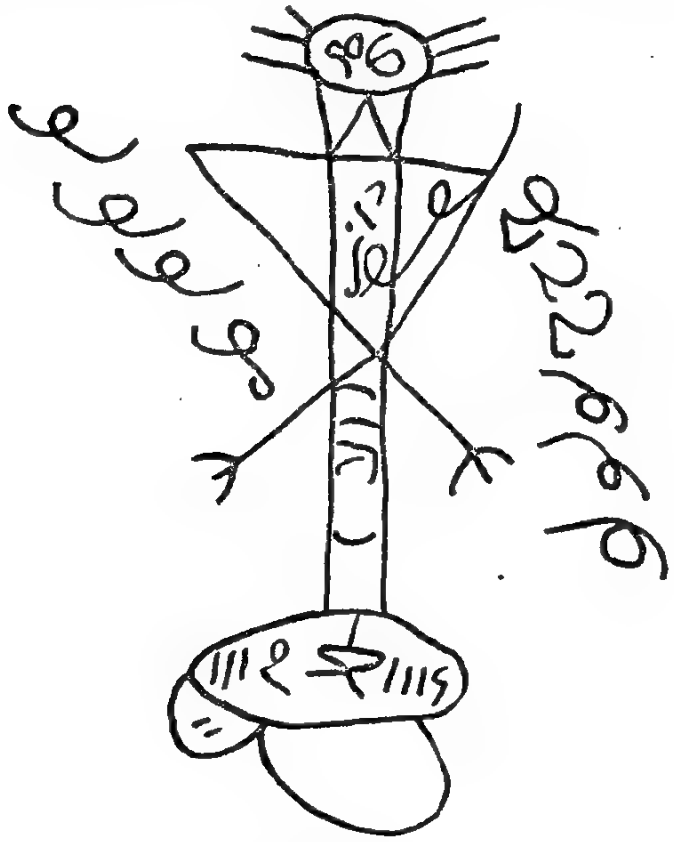

FIG. 6. Amulet for pantak.

Saitan (*Satan*).—The signs shown in fig. 7 have medicinal qualities and are a preservative against satanic diseases brought on by the air. They are drawn on the painful part.

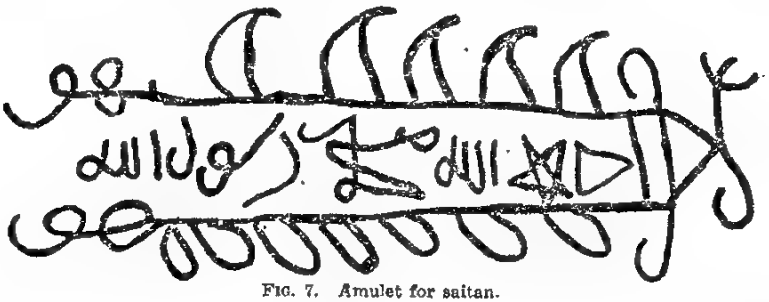

FIG. 7. Amulet for saitan.

Stomach ache, acute.—Saffron, ginger, and *tikuas* in equal parts mixed with burnt *kalamungui* and juice of lemon. The mixture is rubbed on the abdomen without adding water.

Stomach ache with vomiting.—Mix, add vinegar, and drink the following: lubigan, cogon, *buyo*, kisul, ginger, and pepper.

Spitting blood.—Buñgalauan and coral powder well mixed with a little water, to be taken after praying the duana minangung.

Vomiting blood.—Write in a white plate the following:

"Audubilaji biisaki ualkudaraki minsain malaju jad an jua jaalaju ilaju uala ilaja ila laju ua kad pajamata ku naka." Water is then placed in the dish and drunk.

Besides the medicines mentioned in the above prescriptions, the following plants have medical reputations:

Bagú.—Bagú is a small tree growing in the forest. The leaves are macerated in water and applied on the abdomen and temporal regions in cases of fever.

Baricacab.—Baricacab is a plant whose bark is very bitter, from which a decoction is made in cases of intentional abortion.

Bubug.—Bubug is a tree with very bitter bark. It is used by women in intentional abortions.

Gusan.—Gusan is a grass somewhat similar to sugar cane. It grows in the forest. The tender sprouts are boiled in water and drunk in cases of fever.

Lalasabay.—Lalasabay is a plant with leaves similar to the sambung. It has the reputation of curing the enlargement of the spleen due to malaria.

Patauali (*macabuhay*).—This is a creeping forest plant. A decoction is made which is very bitter and is used as a drink for fever.

Tañgan-tañgan.—This is the castor-oil plant. The leaves are used to apply on the ears in cases of earache.

SURGERY AND TREATMENT OF WOUNDS

No surgery is performed by the Maguindanaos. Even in treating an abscess, they ripen it by means of hot water or fomentation of some kind or other; and when it is ripe, the point is opened and tobacco or fine shavings of stalk of coconut is applied to drain the pus.

The following prescription for inflammation or swelling are translated from a *paubatan:*

1. A small amount of rice is toasted brown and pulverized. Mix some saffron, add a little salt and pomelo juice, and apply on the swelling.

2. Crush tender leaves of *lagundi,* mix with a little pomelo juice, and apply on the swelling.

3. Burn the stalk of a mongo tree, pulverize, mix a little wine, warm it up a little, and apply.

In some cases of pain and inflammation wet cupping is resorted to. Several incisions are made on the skin, and then blood is sucked through a horn.

In the treatment of wounds, they use the following means:

1. Kerosene and bandaging with rag.

2. *Tudi* (*caturay*). Tudi is a tree with white flowers that are used as salad by Filipinos and Spaniards. Fine shavings are made of the bark and wood, and the juice is applied to the wound.

3. Salt, lime, and oil, equal parts, cooked together and applied.

4. *Tingan,* or *tigbao* grass. The tender trunk is crushed, and the juice is applied.

The Maguindanaos have no idea of infection and seem to think that pus is a natural secretion of the wound.

MANAGEMENT OF LABOR

The midwife, called *ualian,* helps in the management of labor. A man or another woman pushes the uterus down through the abdominal walls. A pandita prays and blows on the abdomen. The ualian, the helpers, and pandita wash their hands and feet before approaching the patient.

When the labor pains begin, the patient is placed in bed, and the ualian washes the vulva of the woman with water to which bark of *bunduy* (a tree with white flowers) and *karumuñgan* (a kind of grass) have been placed. No further manipulation is necessary, except a gentle massage of the abdomen and a rag held on the anus, but not on the vulva. During the second

stage the expulsion of the child is helped by pushing the uterus down. After the completion of the labor, the uterus is massaged in an upward direction to return it in place.

When the baby is born, the cord is not cut at once, but is allowed to remain until the placenta is expelled. Then the child and placenta are washed with cold water, and after this the cord is extended up to the ear and cut at this level and wrapped with a rag. The cord must be cut with a bamboo knife, because a steel knife is liable to cause pain and inflammation. A steel knife could be used in case of emergency. No medicine is placed at the cut end of the cord.

In a few days the cord falls off, and it is hung on the hammock of the baby. When the baby suffers stomach ache, this dry cord is placed in a cup of water, and the water is given to the child to drink. When the child is older, the dry cord is given him to use as *haguimat* (anting-anting) to be wrapped up in his belt, when he travels to distant places.

The child is not given colostrum to suck, as it would give him stomach ache; it is bathed every day and allowed to go naked.

The mother is allowed to get up after childbirth, and a string is placed loosely around the waist.

If the baby cannot be born, no operative interference is made nor external violence performed, but prayer is offered by the panditas and hadjis.

At the time of quickening during pregnancy *kilidin* is performed, which consists of manipulations by a midwife to straighten the position of the child. This is always performed in cases of primipara, when panditas and relatives of the husband and wife are gathered and other ceremonies are performed, such as, praying, sprinkling the husband and wife with coconut water, etc.

DENTISTRY

The Maguindanaos know how to pull and medicate carious teeth. For a carious tooth they apply ginger and salt heated together and placed while hot in the hole of the tooth.

They do not make any bridge work, but they can put on crowns of silver and gold. One often sees around Cotabato Moros with gold front teeth. These are made by Maguindanao silversmiths and consist of a body of silver that ends at the base in a nail that fits into the pulp cavity, and over the labial surface a thin plate of gold is soldered. The root is prepared by cutting the tooth at the neck. The pulp is allowed to decay, and after a few days it is removed with a nail or wire and the false tooth

is fitted into the canal, but as no dental cement is used, the tooth could be removed at will.

PREVENTION OF DISEASES

The transmission of communicable diseases is favored by conditions similar to those found in the Christian provinces, such as ignorance of the people, unhygienic surroundings, poor nutrition, eating with the fingers, and frequency of travel; however, there are two customs peculiar to the Mohammedan population of Cotabato that add to the means of transmission, such as the habit of washing the genitals after an act of nature and the ceremonies in connection with the dead.

The habit of washing the genitals after an act of nature being sort of a religious mandate, all Moros live on the bank of rivers and streams, as they do not dig wells, and they must defecate or urinate in the water in order to wash properly.

When a Moro dies, all the panditas in the neighborhood and from great distances, if the dead is important, gather around, although uninvited, to offer prayers and get their fees. The corpse is washed very thoroughly by a pandita called *manustican*, special attention being paid to the natural orifices, the abdomen being massaged to press out the remnants of urine and fæces; if fæces do not come out, a finger is introduced into the anus. Then the corpse is wrapped in a white cloth and held in the arms of two or four panditas, *mapasalay*, while the highest pandita present administers the nine kinds of baths prescribed by the Koran.

The Maguindanaos know that chicken pox and measles are contagious, but do not take any means to prevent their spread. In cases of severe epidemics of smallpox some people escape to the forests and hills, but as a general rule they take no precautions.

There is no vaccination performed by the Maguindanaos comparable to vaccinations from pus of true smallpox as performed by Moros in Jolo.

Cases of leprosy are isolated, and the patients are placed in houses away from the community.

In some instances white flags are placed in the houses to prevent the entrance of epidemics, as noted during the cholera of 1915.

ILLUSTRATIONS

PLATE I

FIG. 1. One page of a paubatan (Moro medical book), written by Datu Manguda Ibad.
2. Two facing pages of a paubatan (Moro medical book), written by Saika Datu sa Tavidan.

TEXT FIGURES

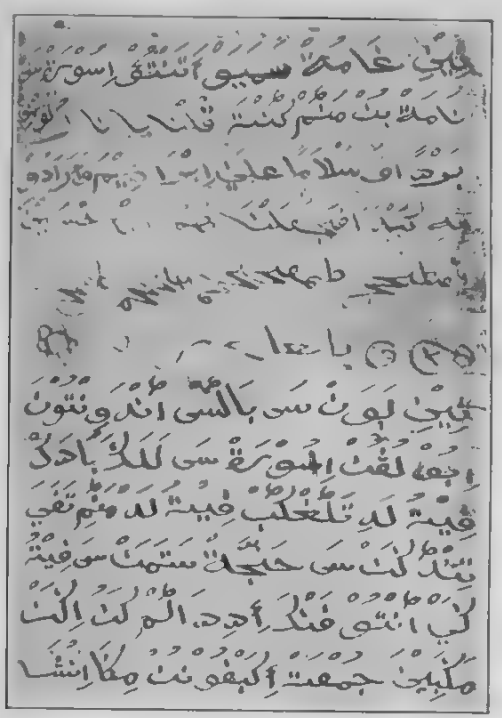

Fig. 1. One page of a paubatan (Moro medical book), written by Datu Manguda Ibad.

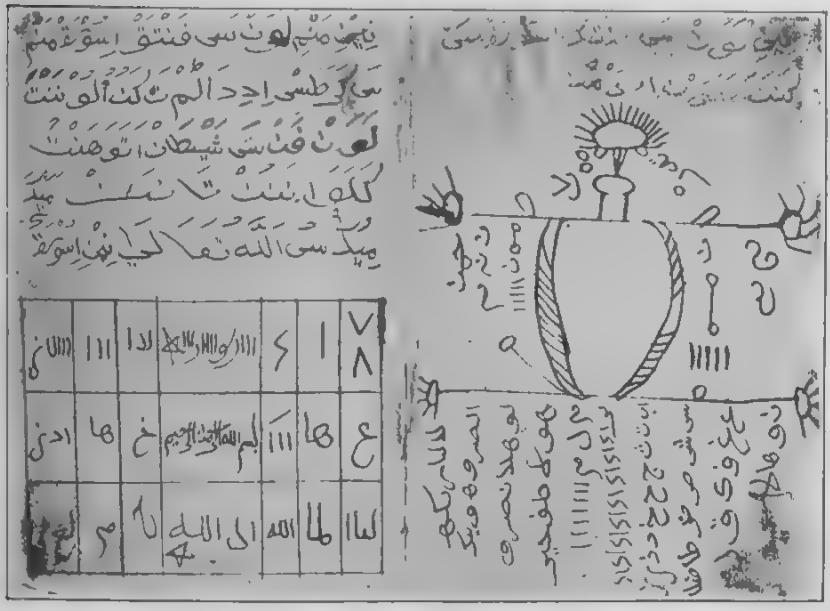

Fig. 2. Two facing pages of a paubatan (Moro medical book), written by Saika Datu sa Tavidan.

PLATE I.

A DISEASE IN CATTLE IN THE PHILIPPINE ISLANDS SIMILAR TO THAT CAUSED BY ANAPLASMA MARGINALE THEILER [1]

By WILLIAM HUTCHINS BOYNTON
(*From the Bureau of Agriculture, Manila*)

THREE PLATES AND ONE TEXT FIGURE

The animals in which this disease was found were native cattle from Batan Island, which is located some 48 kilometers from the northern coast of Luzon. As rinderpest has not been introduced on that island and as the animals from there are highly susceptible to that disease, these cattle are used at the Veterinary Research Laboratory for experimental work on rinderpest.

The animals that were used in the experiments recorded in this paper arrived in Manila by boat from Batan Island on June 7, 1915. They were placed in a corral in Manila until June 19, when they were purchased by the veterinary division, Bureau of Agriculture, for experimental purposes; brought to the Veterinary Research Laboratory at Pandacan on the afternoon of June 19; and placed in quarantine with several other animals. Their temperature was taken twice each day, and their general appearance was noted.

On the morning of July 12, 1915, cow 3929 showed a temperature of 38.6° C. The average temperature for fourteen other cattle kept in the same shed and under similar conditions was 37.8° C. The afternoon temperature of this animal was 39.6° C. Bull 3932 also showed a temperature of 39.7° C. Although these temperatures were higher than those of the other animals, they were not high enough to cause rinderpest to be suspected. Their blood was examined for surra in moist preparations and found negative. This was thirty-five days after arriving from Batan Island and twenty-three days after being brought to the laboratory. On July 13 both of the above animals showed temperatures of over 40° C.; they were immediately taken out of the quarantine shed and placed in the shed with sick animals. Their blood was again examined for surra with negative findings.

On July 15, 1915, bull 3939, which was in the quarantine shed,

[1] Published in *Phil. Agr. Rev.* (1917), 10, 119–127.

showed a morning temperature of 38.8° C. and an afternoon temperature of 40.8° C. This animal was immediately removed and was placed with the sick animals. Its blood was also examined for surra with negative findings.

On July 15, 1915, cow 3929 refused food and had a depressed appearance. On July 16 this animal presented a very depressed appearance, but remained standing and spread its legs as if trying to brace itself to keep from falling; the pulse was 106 per minute; its body was covered with flies, which it made no effort to drive away (Plate I, fig. 1). Since surra could not be found and the animal did not present the clinical picture of rinderpest, further blood examinations were made, and at this time bodies similar to *Anaplasma marginale* were located, about 30 per cent of the red corpuscles being infected.

On July 17 the animal was in a stupor; the respiration was slow and sonorous. It remained standing with its legs spread and its body leaning against the stall. It appeared to lose consciousness with its eyes open and would start to fall, but would recover itself (Plate I, fig. 2). The pulse was 98 per minute and wiry, and pronounced œdema was present under the jaw. The animal was covered with flies, which it made no effort to drive away. There was practically no response on trying to rouse the animal. On the afternoon of the 17th its temperature was 37.4° C., which is subnormal. As it was feared the animal would die during the night and as it was desired to perform the autopsy while the body was in a fresh condition, the animal was led out and killed. When led, it was very weak, moved with great difficulty, and had to be helped by a man on either side to keep it from falling; when standing, it did not need any assistance, as it kept its legs well spread for support (Plate I, fig. 3).

Upon autopsy the blood was found to be very anæmic, having the appearance of slightly hæmolyzed blood. All the visible mucous membranes were pale. There were epicardial hemorrhages at the apex of the heart. The endocardium was pale and bluish, and there was a light red clot in both ventricles. The flesh, in general, was pale and bloodless. The lungs were distended and very pale.

A marked gelatinous infiltration was present, extending along the upper part of the throat and under the lower jaw.

Practically all the lymphatics were swollen and œdematous, exuding a watery serous material upon section. The fat covering the omentum and around the intestines was yellow, as if discolored with bile. The gall bladder was markedly distended,

containing thick green bile almost of the consistency of jam. The liver was brownish yellow, with heavier yellow streaks in places. It was also very friable, but was not enlarged to any noticeable extent.

The spleen was enlarged to one half again its normal size, and the pulp was soft and bulged out on the cut surface upon section.

The kidneys were congested and presented a rather blotchy appearance. The blotches were lighter than the general substance of the organ.

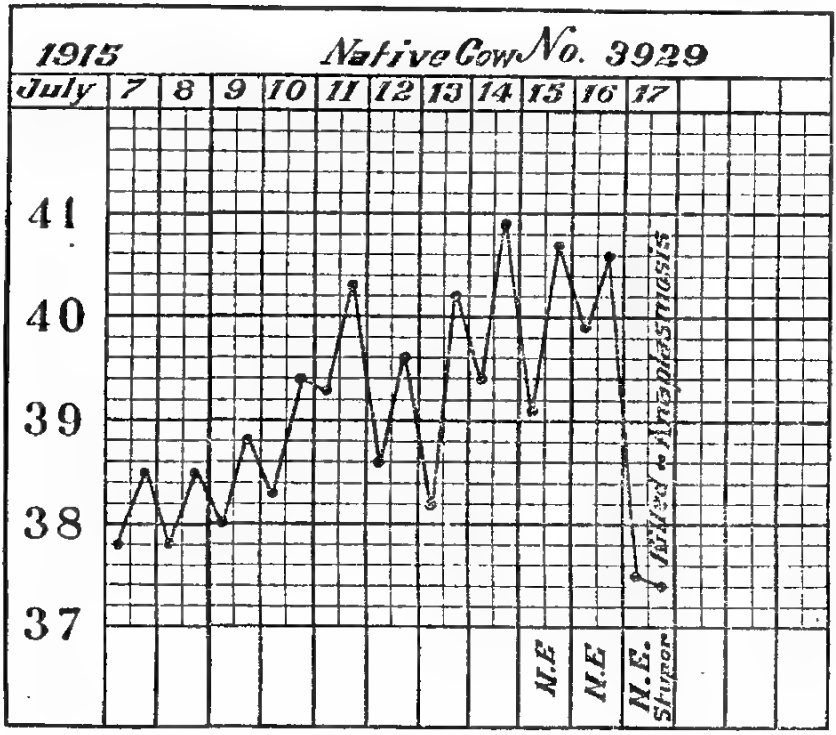

FIG. 1. Temperature chart of cow 3929.

The intestines were streaked with bile their entire length. The fæces in the large bowel were hard and in some places covered with mucus. The fourth stomach contained watery bile-stained fæcal matter; the mucous membrane was slate-colored, and as far as could be noticed contained no hemorrhagic or congested area.

The throat and region of the fauces were free from erosions or congestion.

The entire intestinal tract, except for being bile-stained, was slate-colored. The urinary bladder was markedly distended and

contained slightly turbid yellowish brown urine. No signs of blood or hæmoglobin were in evidence. The general appearance was that of marked anæmia.

Tissues were taken from the heart, spleen, lungs, liver, kidney, fourth stomach, and duodenum. These were fixed in sublimate acetic acid and sectioned.

Five cubic centimeters of heart's blood were immediately taken from cow 3929 and injected subcutaneously into bull 3926. The latter animal was kept under observation until February 29, 1916, and never showed any ill effects from the injection, nor were anaplasmalike bodies ever found in its blood.

Bulls 3932 and 3939 showed a few anaplasmalike bodies in their blood, ranging from 2 to 3 per cent, but both contracted rinderpest after their removal from the quarantine shed and died of that disease.

The blood-smear preparations and sections of tissue were stained with Giemsa's, Wright's, Jenner's, and Hastings's stains. The best pictures were procured with Giemsa's following the technic used by Sieber.(5)

> Cover glasses have to be cleaned well in alcohol, then a thin film of blood is spread on, and, with the smeared side downwards, they are thrown into hot sublimate alcohol (concentrated watery sublimate lotion two parts, alcohol one part). The preparations remain in this solution for two to twenty-four hours. Then they are taken out with small horn forceps, well rinsed, and, in order to remove the sublimate, thrown into a solution of 2 per cent iodide of potash (100 parts) and Lugol's solution (3 parts); rinsed again after ten to fifteen minutes, and in order to remove the iodine put into a watery solution of sodium hyposulphite (0.5 per cent). The preparations having become colorless by the solution of iodine (after five to ten minutes) are now carefully rinsed in water and fit for other staining manipulations. * * *
>
> For Giemsa staining of the above-mentioned smears, diluted Giemsa lotion is used (½ to 1 drop in 1 ccm. aq. dist.). This liquid has to be changed several times during the first two hours, then the preparations are left in the solution for four to twenty-four hours. Then they are well rinsed and brought through the following:
>
> Xylol 5, acetone 95.
> Xylol 30, acetone 70.
> Xylol 70, acetone 30.
> Xylol pure.
>
> According to the degree of differentiation, the preparations are left for a longer or shorter time in the acetone liquids. The preparations are taken out of the pure xylol and placed at once in oil of cedarwood (not Canada balsam).

This method was slightly modified by using 1 to 1,000 potassium carbonate solution instead of the distilled water in making up the stain. This causes the preparations to stain deeper.

MICROSCOPIC PICTURE OF THE BLOOD (PLATES II AND III)

As was stated, the blood was very anæmic, which made it difficult to obtain good, even smear preparations.

In stained preparations the red cells were lacking in hæmoglobin and had a great tendency to become crenate, irrespective of the precautions taken to prevent this. As a rule, the bodies were situated on the margins of the corpuscles. In some instances they protruded over or at least caused the corpuscle to bulge from the margin. Where two bodies were present in one corpuscle, frequently one was situated on the periphery, while the other would be nearer the center, in the center, or beyond the center; in some instances they would be on the periphery of the corpuscle, one on either side. This indicates that frequently after division one of the newly formed bodies remains at or near its original location, while the other migrates to the other side of the corpuscle. In other cases they divide, and both remain at the periphery on the same side of the corpuscle.

Frequently the newly formed bodies after division are of equal size; however, the reverse is common in which one may be much larger than the other. A few instances were noted where division was not complete, one being as much as three times the size of the other, the smaller giving the appearance of a bud protruding from the larger, similar to the condition noticed in yeast cells undergoing multiplication.

As a rule, one or two bodies were found in an infected cell, but four or even five in a cell were not of rare occurrence.

With Giemsa's stain the bodies become a purplish red, staining very brilliantly, and are easy to distinguish. They vary in size from 0.5 micron to 1.5 microns.

They stained uniformly and appeared to be composed of a mass of chromatin with no cellular substance. A slight halo is present around a majority of the bodies, which may be due to the lack of hæmoglobin in their immediate vicinity, but this halo does not have the appearance of a lighter staining body substance.

With Wright's stain the bodies appear smaller than with Giemsa's method. It may be possible that with Wright's method all the chromatin is not stained; however, a body structure could not be distinguished.

Morphologically they are spherical or have a slightly uneven border, thus making any definite shape impossible, but there is a general tendency toward being spherical. Undoubtedly

their shape depends considerably upon the stage of development. If they are fully developed and have not reached the stage for apparent reproduction, they are spherical and have a smooth border. When they reach the stage for multiplication, either equal or unequal fission takes place, thus breaking the evenness of the contours and distorting the spherical shape. They may assume slightly triangular, slightly oval, or various uneven, spherelike shapes. Those recently divided are, as a rule, spherical.

Theiler, (7) in his extensive work on anaplasma, states that *Anaplasma marginale* is transmissible only in blood containing corpuscles, as the organisms have lost their body plasma—for which reason they derive their generic name—and have to exist in the cell protoplasm, making them a strictly intercellular organism. He failed to produce the disease by injecting filtered blood, proving that there was not a stage in the development of the organism which was filterable.

He also shows that the incubation period after the injections of blood containing anaplasma depends upon two conditions. If the amount of blood is large, the incubation period is shortened, and if the strain has been passed through several animals by injection, the same result obtains. He finds this period to average between sixteen and forty days, usually in the neighborhood of from twenty-three to twenty-five days.

He distinguishes two varieties of anaplasma, depending upon their location in the red blood cells, the severity of the disease, and the inability of one to confer complete immunity upon the other. *Anaplasma marginale* is located upon or near the periphery of the cell, and the other *A. marginale* (variety *centrale*) is somewhat small and is located near to, or in, the center of the corpuscle. It has not been noticed that *A. centrale* causes death either by direct inoculation of blood or by tick infestation, while animals affected with *A. marginale* frequently succumb. An animal recovering from *A. centrale* infection, when inoculated with the *marginale* variety, develops the disease, but in a much milder form than would be otherwise encountered, which proves that although there is not a complete immunity there is some protection provided.

The incubation period for this disease after tick infection is rather long and has a wide range, varying from a few days under two months to a few days over three months.

Animals that were immune to *Babesia bigemina* could be infected with anaplasmosis either by means of ticks or by blood inoculation, which proved that *B. bigemina* afforded no

immunity against anaplasmosis. In further experiments Theiler proved that animals recovering from anaplasma infection were not immune to *B. bigemina* either by means of ticks or by blood inoculation. He suggests that in inoculating with *B. bigemina* for the purpose of immunization it is just as well to inoculate with anaplasma at the same time. The inoculation period of *B. bigemina* is so much shorter, that the animal will have ample time to recover before the anaplasma reaction takes place.

He has also proved that animals recovering from *Babesia bigemina* and anaplasmosis can be easily infected with *Babesia mutans*, which shows that no immunity is conferred either separately or together against *B. mutans*.

Theiler proves that two varieties of tick can transmit the disease: *Boophilus decoloratus*, the blue tick, which also transmits *Babesia bigemina*, and the black-pitted tick, *Rhipicephalus simus*.

Frequently a double infection of *Anaplasma marginale* and *A. centrale* is found in the same animal, this being especially true after tick infections.

The three cases herein mentioned are the only ones which have come to any notice during the past twenty months. Further developments of the disease have been awaited, in order to obtain a better insight concerning its etiology, modes of infection, pathology, etc., but with no success, which leaves this paper merely a narrative discussing three cases that gave pictures similar to those described by Theiler and by Sieber as anaplasma infection. This creates a doubt as to whether that disease really exists in the Philippine Islands, or whether these animals suffered from some other ailment which brought about the formation of these anaplasmalike bodies in the red blood cells.

On studying the literature, it is found that bodies similar to anaplasma may be produced artificially. Very creditable work has been done by Dias and Aragao,(2) in which instance they were able to produce anaplasmalike bodies in dogs, rabbits, and guinea pigs by injecting them subcutaneously with small doses of phenylhydrazine. They were also able to produce a similar condition in rabbits by injecting them subcutaneously with small doses of nitrobenzol, a similar condition in dogs by injecting them subcutaneously with small doses of pyrogallic acid, and a similar condition in calves by injecting them with a series of fairly large doses of trypan blue.

In considering these results, there arises a doubt as to whether this was the infectious disease designated by Theiler as anaplasmosis, or whether it was the result of some other infectious or noninfectious disorder from which the above-mentioned an-

imals may have been suffering, thus causing the formation of these bodies in their red blood cells.

Porter(4) has observed anaplasmalike bodies in the red blood cells of mice, canaries, swallows, martins, lizards, snakes, frogs, toads, and sticklebacks, which are representatives of all the great groups of the vertebrates. These bodies were most prevalent in animals that were anæmic.

Balfour(1) has found anaplasmosis in sick donkeys from Malakas on the White Nile and is led to believe they are true protozoan parasites.

Spreull(6) has also observed the marginal points in the blood of cattle in South Africa and declares his conviction that the marginal points are parasitic in nature.

Jowett(3) observed marginal points in the red blood cells of a cat that had been inoculated with a trypanosome infecting cattle in Cape Town, South Africa. This cat was suckling a kitten at the time, and similar bodies were found in the blood of the kitten. He also found similar bodies in the blood of rats infected with this trypanosome and noticed them in the blood of apparently healthy noninfected rats. He also states that—

> In the case of the trypanosome-infected, and consequently anæmic, subjects (both cats and rats) the bodies were, as a rule, more numerously present than in other animals which appeared healthy and which had not formed the subejct of experiment. They were sometimes markedly noticeable in the blood cells of our experimental rats the day following the administration of a dose of antimony.

Jowett quotes Bruce, Hammerton, Bateman, and Mackie as having noted the occurrence of marginal points in cattle (especially calves) in Uganda. These investigators refer to these bodies in the following terms:

> If these bodies really constitute a new and undescribed parasite, the discovery will be one of great interest. Bodies similar in every way to these are found, however, in healthy young rats, goats, calves, etc., so that it is difficult to believe at once in their parasitic nature. Rather would they appear to be cell inclosures due to rapid changes taking place in the blood, such as takes place in young animals or in anæmias.

CONCLUSIONS

1. Cattle 3929, 3932, and 3939 presented bodies in their red blood cells similar to *Anaplasma marginale* as described by Theiler and by Sieber.

2. Cow 3929 presented the symptoms and lesions of anaplasmosis as described by Theiler and by Sieber.

3. The heart's blood of cow 3929 was injected subcutaneously

into supposedly susceptible bull 3926. The blood had no demonstrable effect either physically or by blood examination upon this animal during a period of two hundred twenty-six days.

4. From the results obtained by various investigators and from the results herein cited, nothing definite can be stated as to whether there is an actual infectious disease caused by a protozoan microörganism which Theiler classifies as anaplasma or whether these marginal points are merely secondary effects from various conditions.

5. There is a possibility that there is an infectious disease caused by anaplasma, and that there are bodies formed in the red blood cells from various other conditions which are so similar in appearance and staining reaction to anaplasma that they cannot be differentiated at the present time.

REFERENCES

1. Balfour, A. Anaplasmosis in donkeys, *Journ. Comp. Path. & Therap.* (1911), 24, 44–47.
2. Dias, C. E., and Aragao, H. de B. Pesquizas sobre a natureza dos anaplasmas, *Mem. Inst. Oswaldo Cruz* (1914), 6, 231–249; 2 plates. (See also *Brazil Medico*, April 22, 1913.)
3. Jowett, W. Some observations on the subject of marginal points, *Journ. Comp. Path. & Therap.* (1911), 24, 40–44.
4. Porter, Annie. On anaplasma-like bodies in the blood of vertebrates, *Ann. Trop. Med. & Parasit.* (1915), 9, 561–568.
5. Sieber, Hans. *Anaplasma marginale* (Theiler). *Rep. Gov. Vet. Bac., Dept. Agr., Union of South Africa* (1909–10), 104–116; 5 plates.
6. Spreull, J. "Marginal points" or a new intracorpuscular parasite in the blood of cattle in South Africa, *Journ. Comp. Path. & Therap.* (1909), 22, 354–357.
7. Theiler, A. Further investigations into anaplasmosis of South African cattle, *First Rep. Director Vet. Research, Dept. Agr., Union of South Africa* (August, 1911), 7–46.

ILLUSTRATIONS

[Plates loaned by the Bureau of Agriculture.]

PLATE I

FIG. 1. Cow 3929 leaning against the stall, with legs spread to keep her from falling. Last stages of questionable anaplasmosis.

2. Cow 3929 in a semicomatose condition, respiration sonorous, pulse wiry, body covered with flies, legs spread to keep her from falling. Last stages of questionable anaplasmosis.

3. Cow 3929 just before being slaughtered, body covered with flies, legs spread, œdema under jaw and throat. Animal had a subnormal temperature. Last stages of questionable anaplasmosis.

PLATE II

FIG. 1. Two red blood cells containing anaplasmalike bodies: (*a'*) *marginale* type (Theiler); (*b'*) *centrale* type (Theiler). Notice the halos around the bodies.

2. Two red blood cells containing anaplasmalike bodies: (*a'*) *marginale* type (Theiler), protruding slightly beyond the periphery of the cell; (*b'*) two bodies apparently shortly after division, one remaining on the margin and the other migrating across the cell.

3. A red blood cell containing a body which has almost completed division. Notice the halo around the bodies.

PLATE III

FIG. 1. Two red blood cells containing anaplasmalike bodies: (A) containing two bodies undergoing division; (a') body becoming oval before division takes place; (a'') one body much larger than the other, division almost complete, giving the appearance of budding; (B) two bodies in a cell, both remaining at the margin.

2. A red blood cell containing three anaplasmalike bodies of varying size, giving the extremes in size ordinarily noticed.

3. A red blood cell containing four anaplasmalike bodies, two showing unequal division, and two showing equal division.

TEXT FIGURE

FIG. 1. Temperature chart of cow 3929.

Fig. 1. Cow 3929 leaning against the stall, with legs spread to keep her from falling. Last stages of questionable anaplasmosis.

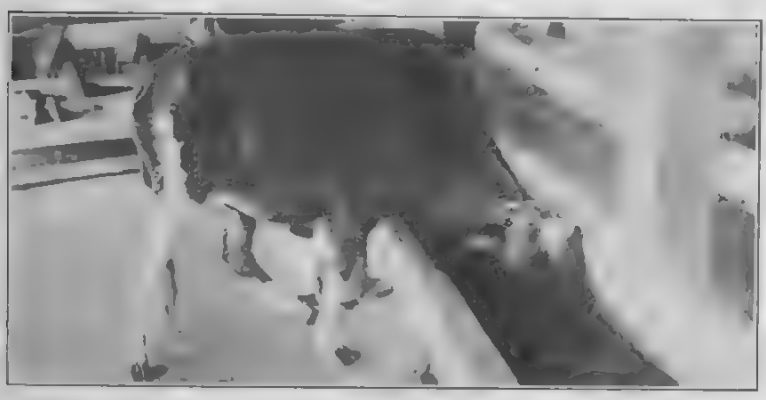

Fig. 2. Cow 3929 in a semicomatose condition, respiration sonorous, pulse wiry, body covered with flies, legs spread to keep her from falling. Last stages of questionable anaplasmosis.

Fig. 3. Cow 3929 just before being slaughtered, body covered with flies, legs spread, œdema under jaw and throat. Animal had a subnormal temperature. Last stages of questionable anaplasmosis.

PLATE I.

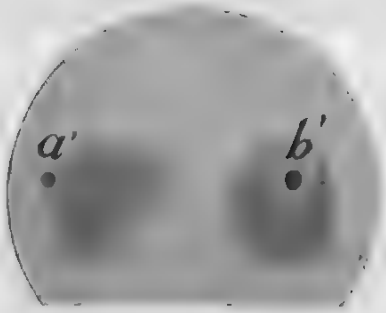

Fig. 1. Two red blood cells containing anaplasmalike bodies: (*a'*) marginale type (Theiler); (*b'*) centrale type (Theiler). Notice the halos around the bodies.

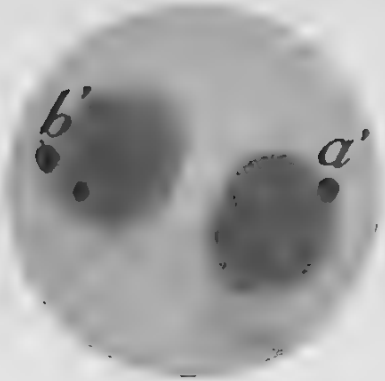

Fig. 2. Two red blood cells containing anaplasmalike bodies: (*a'*) marginale type (Theiler), protruding slightly beyond the periphery of the cell; (*b'*) two bodies apparently shortly after division, one remaining on the margin, and the other migrating across the cell.

Fig. 3. A red blood cell containing a body which has almost completed division. Notice the halo around the bodies.

PLATE II.

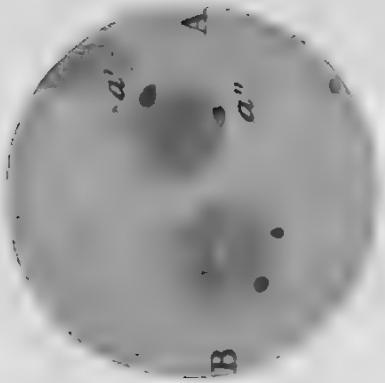

Fig. 1. Two red blood cells containing anaplasmalike bodies: (A) containing two bodies undergoing division; (a') body becoming oval before division takes place; (a'') one body much larger than the other, division almost complete, giving the appearance of budding; (B) two bodies in a cell, both remaining at the margin.

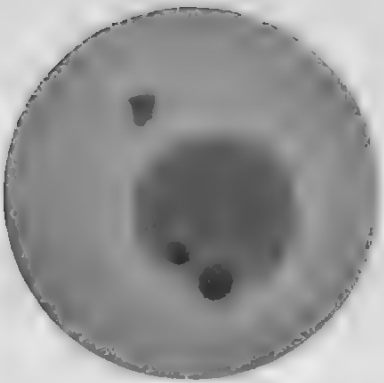

Fig. 2. A red blood cell containing three anaplasmalike bodies of varying size, giving the extremes in size ordinarily noticed.

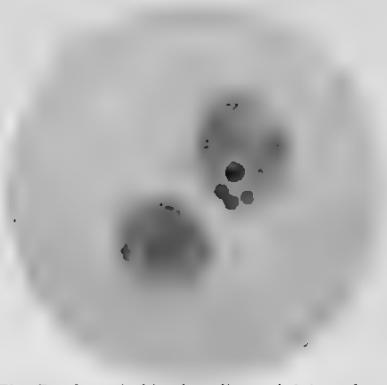

Fig. 3. A red blood cell containing four anaplasmalike bodies, two showing unequal division, and two showing equal division.

PLATE III.

Issued with THE PHILIPPINE JOURNAL OF SCIENCE, SECTION B,
Tropical Medicine, Vol. XII, No. 6, November, 1917.

PROCEEDINGS OF THE MANILA MEDICAL SOCIETY

REGULAR MONTHLY MEETING, OCTOBER 1, 1917

MINUTES OF THE MANILA MEDICAL SOCIETY

The meeting was held in the College of Medicine and Surgery on the evening of October 1, 1917, President Ruth presiding. There were 16 members present and 2 visitors.

The meeting was called to order at 8.45 o'clock. In the absence of the secretary-treasurer, the chair appointed Doctor Gibson as secretary pro tempore.

The minutes of the previous meeting were read and approved.

The council recommended the acceptance of Dr. Frank W. Vincent's application for membership. On motion, duly seconded, Doctor Vincent was elected to membership in the society.

There being no other business, the program for the evening was carried out, after which the society adjourned at 10.15 o'clock.

R. B. GIBSON,
Secretary pro tempore,
Manila Medical Society.

SCIENTIFIC PROGRAM

OBSERVATIONS ON THE INCIDENCE OF INTESTINAL SPIROCHÆTES IN THE PHILIPPINE ISLANDS

By DR. B. C. CROWELL AND PROF. F. G. HAUGHWOUT

The authors presented the results of the examination of the stools of 46 persons undergoing treatment for various ailments in the Philippine General Hospital. Of these persons 73 per cent were found to harbor intestinal spirochætes. The spirochætal infections bore no apparent relation to concomitant infections with protozoa and helminths. The spirochætes varied in size from 2 μ up to a single individual that measured 13 μ. The apex of the biometric curve stood at 4 μ.

The paper constituted a preliminary report on more extended work on the subject, with a view to discover if the spirochætes in association with endamœbæ may not cause lesions that will respond to treatment with salvarsan, it being pointed out that

some cases of intestinal amœbiasis that are refractory to other forms of treatment do respond to treatment with salvarsan.

The paper included a citation of the more important literature on intestinal spirochætes. The authors do not take up the systematic position of the spirochæte seen by them, nor do they attempt at this time to establish its identity with *Spirochæta eurygyrata* Werner, emend. Fatham. The paper was accompanied by the demonstration of stained preparations of the spirochætes by the hæmatoxylin and Benian's methods.

DEMONSTRATION OF OSSIFICATION CENTERS IN THE HUMAN EMBRYO

By Dr. Edward S. Ruth

The method for demonstrating the formation and ossification centers of bones was first described by Schultze. Human embryos up to the sixth and seventh month of intrauterine development may be used for the demonstration of bone formation. The embryo is first placed in 95 per cent and later in absolute alcohol until the soft parts have all shriveled. The specimen is then placed in a 1 per cent solution of potassium hydroxide until the soft tissues are transparent and the calcareous matter can be distinctly seen. Formalin-hardened specimens may be also cleared in this manner, providing a stronger solution of potassium hydroxide is used, up to 10 per cent. After the embryo is fairly transparent, it is placed in a solution consisting of water, 20 parts; glycerol, 20 parts; and strong ammonia water, 30 parts. In this solution it can be left indefinitely, until the specimen is perfectly clear. For permanent mounting it may be placed in glycerol or it may be prepared according to the Bardeen method, that is, splitting the embryo in the saggital plane and mounting it on a glass plate covered with gelatin; this is then placed in a solution of glycerol, which hardens the gelatin by dehydration and fixes the specimen to the glass plate.

A number of human, pig, and duck embryos, which were prepared by the above method, were demonstrated. The human embryos varied from 2 months and 1 week to 4 months and 3 weeks of age.

ACIDOSIS AND THE DETERMINATION OF THE CARBON DIOXIDE OF THE ALVEOLAR AIR

By Dr. R. B. Gibson

The various recently proposed methods [1] for determining the alkaline reserve of the body were discussed, in particular the

[1] Marriott, Van Slyke, and others.

determination of the carbon dioxide of the alveolar air and its limitations. Emphasis was placed on the practicability for clinicians of the colorimetric methods for the carbon dioxide of alveolar air, the indicator method for the hydrogen ion content of the blood, and the titratable acidity plus the fixed ammonia of the urine as an index of acidosis. A simple test and treatment suggested by L. J. Henderson, depending upon the administration of sodium bicarbonate until a urine amphoteric to litmus is obtained, was referred to also. No original observations were presented.

R. B. GIBSON,
Editor of the Proceedings,
Manila Medical Society.

MINUTES OF THE PHILIPPINE ISLANDS MEDICAL ASSOCIATION

A business meeting of the Philippine Islands Medical Association was called to order by President Crowell at 10.15 o'clock in the College of Medicine and Surgery immediately following the adjournment of the Manila Medical Society, for the purpose of electing a second vice president and 3 councilors.

The minutes of the previous business meeting were read and adopted.

The resignation of Colonel C. J. Manly as councilor for two years was accepted with regret. The president stated that the positions of second vice president and councilor for one year were vacant, because of the departure of Doctors Keating and Hillman from the Philippine Islands. The councilor for five years was not elected at the previous meeting. The chair appointed a nominating committee of Doctors Schöbl, Johnston, and de la Paz.

It being moved, seconded, and carried that the association proceed to the election of the above-mentioned officers, the report of the nominating committee was presented as follows:

For Second Vice President:	Dr. Fernando Calderon
For Councilor for five years:	Dr. John A. Johnston
For Councilor for two years:	Dr. Frank W. Vincent
For Councilor for one year:	Dr. Potenciano Guazon.

There being no further nominations, it was moved, seconded, and carried that the secretary cast the unanimous vote of the association for the above nominees.

The president then outlined the proposed plans of the council to hold the next scientific session jointly with the Colegio Médico-Farmacéutico de Filipinas, stating that the approval of the sec-

retary of the American Medical Association had been obtained by the secretary-treasurer for such a meeting.

There being no other business, the association adjourned at 10.45 o'clock.

R. B. GIBSON,
Secretary-Treasurer,
Philippine Islands Medical Association.

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